Banisteria, Number 8, 1996

Odonata Taken in Malaise Traps, with Special Reference to Virginia

Oliver S. Flint, Jr.

Virginia Museum of Natural History
Martinsville, VA 24112

For many years Dr. David R. Smith (Systematic Entomology Laboratory, United States Department of Agriculture) has been operating Malaise traps in various parts of Virginia and adjacent states as part of his survey program for sawflies. In the past few years he has extracted and sent to me the material of the various "neuropteroid" orders (Ephemeroptera, Mecoptera, Neuroptera, Odonata, Plecoptera and Trichoptera) taken by this collecting technique. I have retained examples of all species for the National Collection of insects at the Smithsonian Institution, and deposited duplicates in both the Virginia Museum of Natural History and the Snow Museum, University of Kansas. Starting with the collections from late 1993, I saved examples of all the species of dragonflies and damselflies that were captured: all specimens of the scarcer forms and a pair (when both sexes were present) from each trapping period, of those more frequently taken.

The use of Malaise traps to capture these insects has gained increasing attention from odonatologists in recent years (Johnson, Kovarik & Glotzhober, 1995; Roble, 1994, 1995; Muzón & Spinelli, 1995). In addition to success experienced by Dr. Smith, my own personal experience with this technique in Latin America has been generally rewarding.

Dr. Smith uses a Townes-style Malaise trap (Townes, 1972; Barrows et al., 1994) about 1.7 meters long by a 1.2 meters wide with a median vertical partition. The gabled roof slopes up from the low end, a meter high, to 2 meters at the high end where a quart jar is attached to a metal ferrule with an opening 50 mm in diameter. The jar is filled with 95% alcohol, which gives good color preservation, although producing hardened and brittle specimens over a period of several months. The traps were emptied about every two weeks except early and late in the season, when three to four weeks may elapse between checks. The relatively small size of the trap seems quite effective, perhaps because it may more effectively confuse and trap larger insects. The large mouth jar allows easy entry for small odonates and even large ones such a *Tachopteryx thoreyi* are able to squeeze in.

My experience has been with a much larger trap, about 5 meters long by 2 wide, with dry killing chambers attached to each end. The inwardly-directed, cone-shaped baffle with a small opening (18 mm) leads into a cyanide jar. I try to find a safe place to leave the trap across a stream, and empty the killing chamber once or twice a day. With this timing, the specimens easily have their wings folded together and can be degreased by immersion in acetone, with excellent results. These traps routinely collect damselflies and small dragonflies, and, rarely, I may find a large dragonfly hanging from the fabric inside the trap.

LOCALITIES

Traps were run for six years at the University of Virginia, Blandy Experimental Farm, 3 km S Boyce (39°05' N, 78°10' W) in Clarke County, Virginia at an elevation of 160 m. Six to eleven traps were run each year, about half of them in a wooded area on the west side of the farm, the other half in open, moist meadows and over small streams and nearby small ponds on the east side of the farm. In addition to the small streams and ponds, the Shenandoah River flows about 5.5 km to the east. The traps were operated between April 4 and October 17 in 1994 and April 3 to October 30 in 1995.

The other primary site is on the property of John G. Kloke, 1.5 km SE Dunnsville (37°52' N, 76°48' W) in Essex County, Virginia at nearly sea-level. Here ten to twenty traps were operated yearly for five years in a variety of sites. One trap was placed over a small, intermittent

stream, several others were placed over small, boggy spots; the Rappahhanock River is about 2.5 km northeast. The majority of the traps were placed in wooded sites or along margins of the woods in cut-over areas. The collections were pooled from all traps. The traps were erected on March 7 and taken down on November 15 1994 and from March 7 to November 20 in 1995.

Traps were also operated in small numbers at several other sites on different years and often collected a few odonates. A trap has been in operation for 15 years in the shrubbery in Dr. Smith's yard in Holmes Run Acres, about 3 km NW of Annandale (38°50' N, 77°12' W) in Fairfax County. Odonata were only taken in 1995; the closest water is Holmes Run about half a kilometer away. In 1993 (and two other years), four traps were operated at the Beltsville Agricultural Research Center (39°02' N, 76°52' W), in Prince George County, Maryland. The traps were situated in both wooded areas and near to small streams and ponds on the grounds. A few damselflies were taken. At another Maryland site, two traps were operated for 1992-1993 by Dr. E. M. Barrows of Georgetown University, Washington, DC who kindly presented us with the residual collections. The Odonata were retained in 1993. The site is in Garrett County at 825 meters elevation, and known as Finzel Swamp about 2 km S of Finzel (39°38' N, 79°00' W). The traps were placed at the woods edge near the margin of the swamp. In 1994 and 1995 two traps were in operation in Hardy County, West Virginia at about 5 km NE of Mathias (38°55' N, 78°49' W). One of the traps was placed over a small, intermittent stream the other in the woods at the crest of the hill.

RESULTS

The first and last days of the seasonal range of a species are those of the day the trap first started operation after emptying to the day of emptying; the specimen may well have entered at any date in the trapping period, but there is no way of knowing precisely. The numbers and sexes are listed for those species where all examples were kept; for those without such data only a representative pair (if present) were kept on each date.

CALOPTERYGIDAE

Calopteryx maculata (Beauvois)

VA, Clarke Co.: 24 May-19 July 1994, 15 June-11 July 1995
VA, Essex Co.: 1 June-16 August 1994, 8-22 June 1995

LESTIDAE

Lestes disjunctus australis Walker

VA, Clarke Co.: 4 April-3 June 1994, 20 April-4 May 1995
VA, Essex Co.: 9-12 April 1994 [1♀], 12-26 April 1995 [2♂]

Lestes forcipatus Rambur

VA, Clarke Co.: 15 June-19 July 1994 [3♂,2♀], none 1995

Lestes congener Hagen

VA, Clarke Co.: 15-24 June [1♂ teneral], 3 September-17 October 1994 [8♂,5♀ mature], 15 June- 11 July [3♂,1♀ teneral], 12 September-3 October 1995 [3♂ mature]

Lestes rectangularis Say

VA, Clarke Co.: 24 May-17 October 1994, 15 June-24 July 1995
VA, Essex Co.: 1 June - 16 August 1994, 8 June-15 July 1995
VA, Fairfax Co.: 23-29 July 1995 [1♂]
MD, Prince Georges Co.:20-31 August 1993 [1♂]
MD, Garrett Co.: 20 July-9 August 1993 [3♂,1♀]

COENAGRIONIDAE

Amphiagrion saucium (Burmeister)

VA, Clarke Co.: none 1994, 20 May-1 June 1995 [1♀],

Argia moesta (Hagen)

VA, Clarke Co.: 25 June-3 August 1994 [1♂,1♀], none 1995

Argia sedula (Hagen)

VA, Clarke Co.: 20 July-3 August 1994 [1♂], none 1995

Argia fumipennis violacea (Hagen)

VA, Clarke Co.: 4-18 August 1994 [1♀], none 1995

Chromagrion conditum (Hagen)

VA, Clarke Co.:24 May-3 June 1994 [1♂], 20 May-1 June 1995 [1♂]
VA, Essex Co.: none 1994, 13-24 May 1995 [1♂]
WV, Hardy Co.: none 1994, 8-27 May 1995 [1♀]

Enallagma aspersum (Hagen)

VA, Clarke Co.: 29 April-2 September 1994, none 1995

Enallagma civile (Hagen)

VA, Clarke Co.: 6 July-21 September 1994, none 1995

Enallagma exsulans (Hagen)

VA, Fairfax Co.: 25 June-1 July 1995 [1♀]

Enallagma geminatum Kellicott

VA, Clarke Co.: 24 May-3 June 1994 [1♂], none 1995
VA, Essex Co.: 4-17 May 1994 [1♂], none 1995
MD, Prince Georges Co.: 29 July-31 August 1993 [4♂]

Enallagma hageni (Walsh)

MD, Garrett Co.: 10-20 July 1993 [1♂]

Enallagma signatum (Hagen)

VA, Clarke Co.: 15-24 June 1994 [1♂], none 1995

Enallagma vesperum Calvert

MD, Prince Georges Co.: 10-20 September 1993 [1♂]

Ischnura (Anomalagrion) hastata (Say)

VA, Essex Co.: none 1994, 12-26 April [3♂], 1-16 August 1995 [1♀]

Ischnura (I.) posita (Hagen)

VA, Clarke Co.: 4 April-17 October 1994, 20 April-24 July 1995
VA, Essex Co.: 26 March-21 June 1994, 12 April-15 July 1995
VA, Fairfax Co.: 4-10 June 1995 [1♂]
MD, Prince Georges Co.: 20-28 July 1993 [1♂,1♀]
MD, Garrett Co.: 30 June-10 July 1993 [1♂]

Ischnura (I.) prognata Hagen

VA, Essex Co.: none 1994, 27 April-24 May 1995 [2♂]

Ischnura (I.) verticalis (Say)

VA, Clarke Co.: 16 April-21 September 1994, 20 April-3 October 1995

MD, Garrett Co.: 30 June-29 August 1993 [3♂,1♀]

Nehalennia gracilis Morse

VA, Essex Co.: none 1994, 8-22 June 1995 [1♂]

PETALURIDAE

Tachopteryx thoreyi (Hagen)

VA, Essex Co.: 22 June-1 July 1994 [1♀], none 1995

CORDULEGASTRIDAE

Cordulegaster (Taeniogaster) obliqua (Say)

VA, Essex Co.: 11 June-1 August 1994 [4♂,1♀], 8-22 June 1995 [1♂]

Cordulegaster (Zoraena) bilineata Carle

VA, Essex Co.: 22 April-3 May 1994 [3♀], 27 April-12 May 1995 [2♂,1♀]

AESHNIDAE

Anax junius (Drury)

VA, Clarke Co.: 4-15 April 1994 [1♂], none 1995

Basiaeschna janata (Say)

VA, Essex Co.: 9-21 April 1994 [1♂,1♀], none 1995

Boyeria vinosa (Say)

VA, Clarke Co.: 25 June-19 July 1994 [1♂,1♀], none 1995
VA, Essex Co.: 2-15 July 1994 [1♀], 6-15 July 1995 [1♀]
WV, Hardy Co.: 5-18 July 1994 [1♂], 14 August-4 September 1995 [1♂]

Epiaeschna heros (Fabricius)

VA, Clarke Co.: none 1994, 20 May-1 June 1995 [1♀]

Gomphaeschna furcillata (Say)

VA, Essex Co.: 22 April-3 May 1994 [2♂,1♀], none 1995

Nasiaeschna pentacantha (Rambur)

VA, Essex Co.: 10-21 June 1994 [1♂,1♀], none 1995

GOMPHIDAE

Dromogomphus spinosus Selys

VA, Essex Co.: none 1994, 8-22 June 1995 [1♀]

Gomphus exilis Selys

VA, Essex Co.: 22 April-3 May 1994 [1♂], 12 April-12 May 1995 [2♂,2♀]

Gomphus lividus Selys

VA, Essex Co.: 22 April-3 May 1994 [1♂,1♀], none 1995

Gomphus rogersi Gloyd

VA, Essex Co.: 1-4 June 1994 [1♀], none 1995

CORDULIDAE

Somatochlora provocans Calvert

VA, Essex Co.: 2-16 August 1994 [1♀], none 1995

Somatochlora tenebrosa (Say)

VA, Essex Co.; 22 June-1 July 1994 [1♀], 16-31 July 1995 [1♀]

Tetragoneuria cynosura (Say)

VA, Essex Co.: 22 April-3 May 1994 [1♀], 27 April-12 May 1995 [1♀]

LIBELLULIDAE

Erythemis simplicicollis (Say)

VA, Clarke Co.: 6-19 July 1994 [1♂], none 1995
VA, Essex Co.: 22 June-1 July 1994 [1♂,1♀], 8 June-16 August 1995 [8♀]

Libellula (L.) incesta Hagen

VA, Essex Co.: 2-16 August 1994 [1♀], 1-16 August 1995 [1♀]

Libellula (Belona) luctuosa Burmeister

VA, Clarke Co.: 25 June-5 July 1994 [1♂,1♀], none 1995

Libellula (Plathemis) lydia (Drury)

VA, Clarke Co.: 25 June-5 July 1994 [1♀], none 1995
VA, Essex Co.: 22 April-1 August 1994 [1♂,3♀], 8 June-31 July [3♂,5♀]

Libellula (L.) needhami Westfall

VA, Essex Co.: 11-21 June 1994 [1♀], 16-31 July 1995 [1♀]

Pachydiplax longipennis (Burmeister)

VA, Clarke Co.: none 1994, 15-29 June 1995 [1♀]
VA, Essex Co.: 2-16 August 1994 [1♀], none 1995

Sympetrum ambiguum (Rambur)

VA, Clarke Co.: 29 September-25 October 1993 [2♂], none 1994, 1995

Sympetrum obtrusum (Hagen)

MD, Garrett Co.: 20-30 July 1993 [1♂,1♀]

Sympetrum rubicundulum (Say)

VA, Clarke Co.: 25 June-3 August 1994 [3♂], none 1995

Sympetrum vicinum (Hagen)

VA, Essex Co.: 2 July-6 September 1994 [1♂,1♀], 1-16 August 1995 [1♀]

DISCUSSION

The traps in Clarke Co. collected 16 species of Zygoptera and nine of Anisoptera, those in Essex Co. collected nine species of Zygoptera and 20 of Anisoptera, while the Fairfax Co. site yielded only three species of Zygoptera. Overall the traps yielded 20 damselfly species out of a total of 54 known for the state, or 37%, and for the dragonflies 25 species out of 182, or only 14%. Obviously, the traps were, as expected, much more successful trapping damselflies than dragonflies. The records of the damselflies are, at least for the common species, much more likely to give the full, seasonal flight range than are those of the dragonflies. Even so, it is

surprising how often a single specimen of a dragonfly species will be taken in the traps during the same time period on successive years.

Undoubtedly the length of flight seasons of the damselflies were quite different in the two years, with 1995 being shorter than 1994. There was a severe drought during the summer of 1995 which resulted in all the water courses and ponds at Blandy drying up early in the summer, although they retained water all 1994. This not only resulted in shorter flight seasons, but all the *Argia* and *Enallagma* species disappeared. The effects at Dunnsville were lesser, but even here there is shortening of flight periods for some species.

Upon study of Figures 1 and 2 several interesting observation on certain species are apparent.

The genus *Lestes*: At Blandy, there is in both years an interesting hiatus in the flight season of *congener*, the early period containing only teneral examples, and the later period mature ones. This suggests to me that after emergence the individuals disperse somewhere away from the breeding site to mature and perhaps estivate until cooler, wetter fall comes and they return to the breeding sites. The three species *disjunctus australis*, *forcipatus* and *congener* (mature individuals) appear to follow one another through the season with *rectangularis* overlapping all, to some degree, during the summer and fall.

The genus *Argia*: Only one or two specimens of each species were taken at Blandy, suggesting that these wandered into the area, perhaps from the Shenandoah River.

Chromagrion conditum: Five examples of this species were taken, only one per collection/year. Yet all appeared between the eighth of May and the third of June.

A number of species of known, short, flight periods were taken in both years in Dunnsville during overlapping time periods: *Cordulegaster obliqua*, *C. bilineata*, *Gomphus exilis*, and *Tetragoneuria cynosura*. Of a similar nature are the records for *Boyeria vinosa* which was taken at three sites, sometimes on both years and generally as single specimens. Most were clustered into the first half of July with a single late record from the last half of August.

The capture range for *Somatochlora provocans* at Dunnsville, 2-16 August, is the latest date known in Virginia for this species; its previously known last date was 17 July (Roble & Hobson 1996).

LITERATURE CITED

Barrows, Edward M., Samantha S. Wolf, & Darren M. Lynch. 1994. Diflubenzuron effect on yellowjacket (Hymenoptera: Vespidae) worker numbers in a central Appalachian broadleaf forest. Journal of Economic Entomology 87: 1488-1493.

Donnelly, T.W. 1994. [Note on *Gomphus rogersi* in Virginia]. Argia 6(1): 13.

Johnson, Norman F., Peter W. Kovarik, & Robert C. Glotzhober. 1995. Dragonflies in Malaise traps. Argia 7(1): 21-22.

Muzón, Javier, & Gustavo R. Spinelli. 1995. Patagonian Odonata in Malaise traps. Argia 7(3): 22-23.

Roble, Steven M. 1994. A preliminary checklist of the damselflies of Virginia, with notes on distribution and seasonality (Odonata: Zygoptera). Banisteria 4: 3-21.

Roble, Steven M. 1995. [Note on Malaise trap records of Virginia Odonata]. Argia 7(2): 3.

Roble, Steven M., & Christopher S. Hobson. 1996. The Odonata of Fort A.P. Hill and vicinity, Caroline County, Virginia. Banisteria 7: 11-40.

Townes, Henry. 1972. A light-weight Malaise Trap. Entomological News 83: 239-247.

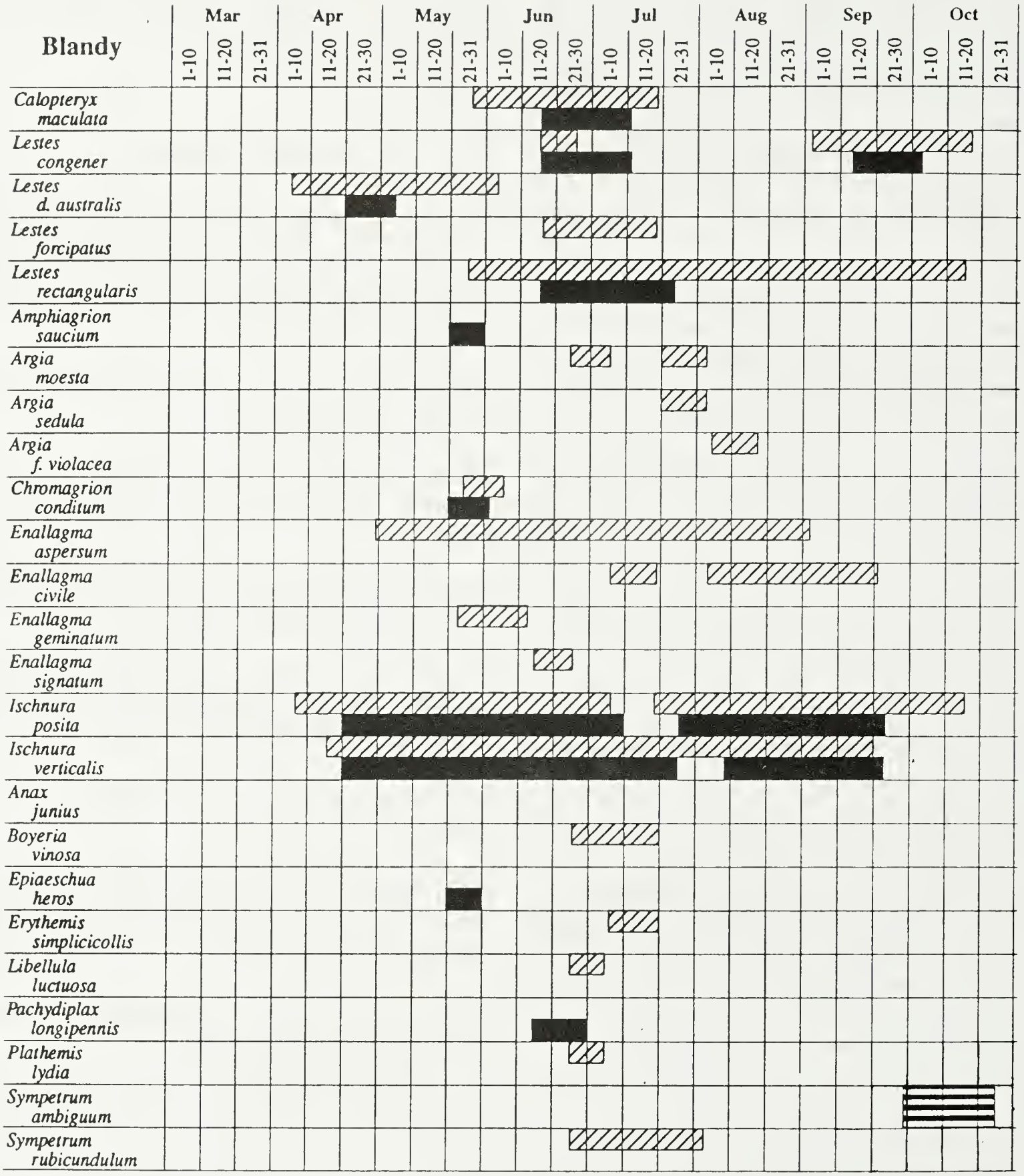

Figure 1. Flight periods for Odonata appearing in Malaise traps at Blandy, Clarke Co., VA in 1994 and 1995 (one record from 1993). Each month divided into 10 or 11 day periods. Data for 1993 shown as horizontal bars, for 1994 as diagonal shading, for 1995 in solid black.

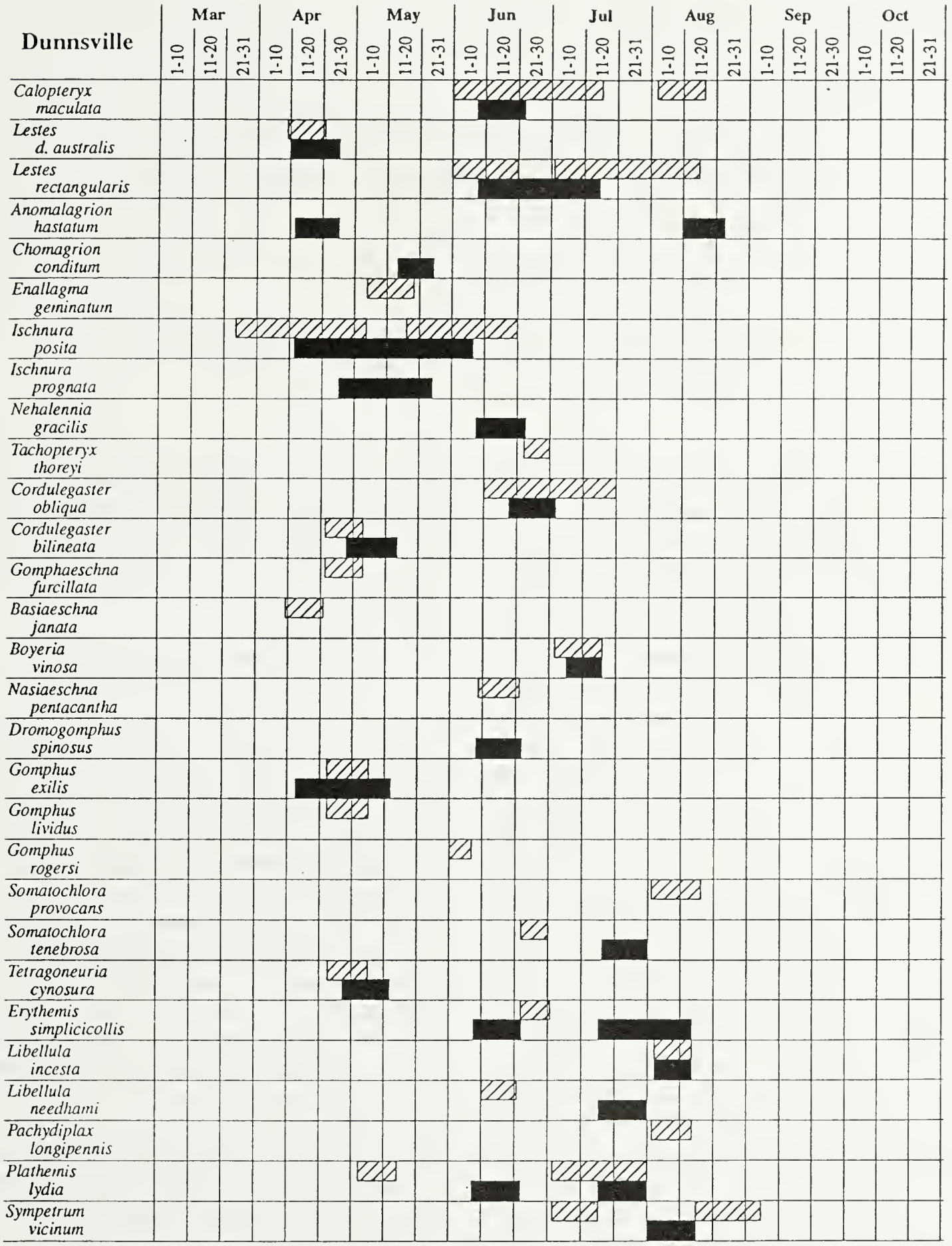

Figure 2. Flight periods for Odonata appearing in Malaise traps at Dunnsville, Essex Co., VA in 1994 and 1995. Each month divided into 10 or 11 day periods. Data for 1994 as diagonal shading, for 1995 in solid black.